

Influence of Cucumber Mosaic Virus on Growth, Moisture and Dry Matter Content of Chilli (*Capsicum annuum* L.)

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SUMMARY

A study was made on the effect of two chilli strains (severe and mild) of cucumber mosaic virus infections on the growth, moisture and dry matter content in chilli. The infection affected the growth of the plants adversely. More dry matter and less moisture contents were found in diseased plants as compared to healthy plants. The effect was more pronounced with severe strain.

Chilli (*Capsicum annuum* L.), also called red pepper is an important cash crop in India and grown for its pungent fruits which are commonly used both green and ripe. Chilli mosaic disease is caused by cucumber mosaic virus (Anjaneyulu and Appararao, 1967; Pandey *et al.*, 2004). Most of the investigations, done in the past on this disease were confined to the characterization of the virus (Mishra, 1963; Rao *et al.*, 1970) and so far no study has been made on the physiology of infected plants to understand the effect of virus infection on the metabolism of host. In the present study, two locally collected chilli strains (mild and severe) were selected to see their effect on growth, moisture and dry matter content in popular "Pusa jwala" variety of chilli.

MATERIALS AND METHODS

Observations were made after 10, 20, 30, 40 and 50 days of inoculation. Three lots of 25 chilli plants were taken, first and second lots were inoculated with mild and severe strains of the virus, respectively. While the third lot was kept as healthy (control).

Seedlings were 15 days old at the time of inoculation. The growth was measured in centimeter. The moisture content of root, stem and leaves of healthy and diseased chilli plants were determined. Root, stem and leaves from five healthy and five diseased plants were collected separately in polythene bags and weighed to determine the fresh weight. These were then transferred to an oven and dried at 65°C till a constant weight was obtained. The

differences between fresh and dry weight was taken as the moisture content. The moisture content thus obtained has been expressed as per cent moisture on fresh weight basis.

Average dry weight of root, stem and leaves from five plant were taken per treatment at each interval and evaluated as per cent dry matter content on fresh weight basis. All experiments were carried out in an insect proof chamber. The data were analysed statistically using the methods given by Chandel (2004).

RESULTS AND DISCUSSION

The perusal Table 1 shows that both the strains reduced the growth of chilli plants. The severe strain induced more adverse effect than the mild one. When statistically analysed, the data were non-significant at 5 per cent level except in 40 and 50 days of inoculation. The perusal data Table 2 and 3 show that the

Table 1 : Effect of severe and mild strains of cucumber mosaic virus on the growth of chilli plants

Days after inoculation	Healthy plant	Plant height in (cm.) (Average)	
		Severe strain	Mild strain
10	7.00	4.00	5.5
20	10.00	7.00	8.00
30	15.00	9.00	11.00
40	21.5	12.00	16.00
50	33.0	17.00	21.5
Average	17.3	9.8	12.4
S.E.± =	4.15	1.99	2.57
C.D. (P=0.05)	8.84	4.24	5.47

Key words :

Metabolic activity,
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Table 2 : Moisture content (per cent) of plant parts of chilli infected with two strains of cucumber mosaic virus

Days after inoculation	Root			Stem			Leaf		
	Health	Infected		Health	Infected		Health	Infected	
		Severe	Mild		Severe	Mild		Severe	Mild
10	62.3	58.3	60.5	62.5	59.0	61.2	63.0	61.0	62.0
20	56.9	62.3	63.2	65.0	62.5	63.4	66.0	62.0	62.5
30	69.8	65.2	67.0	69.5	66.0	67.8	69.5	64.5	65.0
40	72.7	67.8	68.6	71.4	66.8	70.0	73.8	65.2	69.0
50	75.0	70.5	71.8	77.8	73.2	74.5	75.0	70.2	72.0
Average	67.34	64.82	66.22	69.24	65.5	67.38	69.46	64.58	66.1
S.E.± =	3.02	1.94	1.78	2.38	2.14	2.11	2.03	1.43	1.72
C.D. (P=0.05)	6.43	4.13	3.79	5.07	4.51	4.49	4.32	3.04	3.66

Table 3 : Dry matter content (per cent of fresh weight) of chilli infected with two strains of cucumber mosaic virus

Days after inoculation	Root			Stem			Leaf		
	Health	Infected		Health	Infected		Health	Infected	
		Severe strain	Mild strain		Severe strain	Mild strain		Severe strain	Mild strain
10	39.5	41.8	41.0	39.4	41.5	40.5	37.0	39.0	37.8
20	35.3	39.7	38.7	37.0	29.7	38.0	33.6	38.0	37.2
30	31.8	36.2	35.0	32.1	36.2	39.0	31.6	34.5	35.0
40	29.2	33.3	32.8	30.5	35.2	34.0	26.2	34.3	31.0
50	26.5	30.5	29.0	24.5	28.5	27.5	25.0	28.2	27.5
Average	32.46	36.3	35.3	32.7	34.22	34.4	30.68	34.8	33.7
S.E.± =	2.04	1.84	1.9	2.33	2.11	2.04	2.02	1.61	1.75
C.D. (P=0.05)	4.34	3.92	4.85	4.96	4.49	4.34	4.3	3.43	3.72

infection had influenced the dry matter content and moisture level of the host plant. Root, stem and leaf samples taken from infected plants had less moisture content and more dry matter than their comparable healthy counterparts on fresh weight basis but the moisture content whether taken from healthy or infected samples increased gradually with the age of the plant, while the dry matter content indicated a reverse trend calculated on fresh weight basis. Most of the data were found to be non-significant at 5 per cent level when analyzed statistically.

There are various reports on the reduction of growth in plants due to virus infection (Caldwell, 1934; Jeyarajan and Ramakrishnan, 1961; Srivastava *et al.*, 2005; Dubey, 1972; Srivastava, 1971, 1978 and Suteri, 1974).

In this study the reduction in growth of chilli plants has been recorded as a result of virus infection. No precise cause can be given as to what exactly contributed to this stunting but there are reports available which show disturbed auxin metabolism in virus infected plants (Grieve, 1936, Smith *et al.*, 1968).

Many workers have reported the effect of virus infection on dry matter and moisture content of plants infected with different viruses (Campbell, 1925; Dubey,

1972; Srivastava, 1971, 1978 and Suteri, 1974).

In the present study it was observed that root, stem and leaves samples taken from infected plants had less moisture content invariably (Table 2) and more dry matter content (Table 3). Moisture content of root, stem and leaf increased continuously with age of the plant in both healthy and infected samples. (Grieve, 1936; Smith *et al.*, 1968; Campbell, 1925; Caldwell, 1934; Srivastava, 1971, 1978 and Srivastava *et al.*, 2005). The changes in the dry matter and moisture content was pronounced in plants infected by severe strain virus as compared to mild strain of cucumber mosaic virus (CMV).

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